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Salivary Alpha-amylase Assessment of Pre-Event Anxiety Profiles among University Combative Sports Athletes Proximal to Competition

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A B S T R A C T

This study assessed the pre-event anxiety profiles through the use of salivary alpha-amylase in university combative sports athletes proximal to competition to inform effective personalized psychological interventions tailored to sport and gender. Fourteen (14) university athletes, 7 boxers (M=34.23, SD=5.96) and 7 judokas (M=34.91, SD=4.17) with Age M = 21.29 voluntarily participated in the study. Saliva samples were collected at two time points, 2 months apart at 9:00 a.m., to control for diurnal cortisol variation, and analyzed using the ELISA protocol. T-tests and ANCOVA were used to determine statistical significance at the 0.05 level. Results showed that salivary alpha-amylase can significantly assess the pre-event anxiety profile ($f=1$, 48.84, $p < .05$) of university combative sports athletes, with no significant gender-based differences between genders [t (12) = -0.24, $p > .05$] or sports-based difference [t (6.68) = 1.47, $p > .05$]. Although judokas and female athletes had higher mean sAA levels than boxers and male athletes. Sport psychologists and coaches are admonished to use salivary alpha-amylase monitoring in conjunction with psychological assessments to create customised arousal regulation strategies for individual pre-event anxiety responses, with particular attention to subtle sport- and gender-related physiological trends.

1. Introduction

Sports psychology has long placed a high priority on evaluating athletes' anxiety, especially in high-stakes situations like competitive sports. Because of their high-performance pressure, tactical unpredictability, and intense physical contact, combative sports like boxing and judo pose particular psychological challenges (Grushko et al., 2016; Rossi et al., 2022; Ziv & Lidor, 2013). Understanding the psychophysiological indicators linked to pre-event anxiety in these athletes is essential for creating mental resilience programs, performance optimisation

techniques, and successful psychological interventions. Self-report scales and questionnaires are examples of traditional anxiety assessment instruments that are subject to subjective bias and may not accurately reflect an athlete's physiological state in real time. Therefore, the use of salivary biomarkers, such as salivary alpha-amylase (sAA), in sports psychology research has increased as a result of the quest for more objective, real-time, and biologically valid measures (Nater & Rohleder, 2009; Papacosta et al., 2015).

The non-invasive biomarker salivary alpha-amylase (sAA) indicates the sympathetic nervous system's (SNS) activity. sAA reacts quickly to acute psychological stress through the sympathetic-adrenal-medullary (SAM) system, in contrast to cortisol, which is linked to the hypothalamic-pituitary-adrenal (HPA) axis and shows a slower temporal response to stress (Nater & Rohleder, 2009). sAA is especially useful for capturing fleeting shifts in physiological arousal right before competitive events because of its quick response.

Acute spikes in sAA levels have been seen right before competition in sports, including running, judo, karate, and archery, demonstrating the usefulness of sAA in these settings (Obmiński et al., 2017). These increases frequently coincide with elevated anxiety, indicating a strong correlation between sAA secretion and dysregulation, or psychophysiological preparedness, before performance (Ali & Nater, 2020). As combative sports, boxing and judo have different tempos, strategies, scoring systems, and physical interactions. Athletes must concentrate on anticipatory movements, defensive positioning, and quick counterattacks because boxing is characterised by high-intensity intermittent striking (Franchini et al., 2019).

On the other hand, Judo focuses on body leverage, tactical throws, and close physical contact in grappling-based competitions (Miarka et al., 2018; Ziv & Lidor, 2013). The psychophysiological stress responses of athletes, such as sympathetic nervous system activity as measured by salivary alpha-amylase (sAA) levels, are influenced by these sport-specific demands. For example, depending on individual differences in sport-specific training and psychological conditioning, the anticipatory arousal inherent in boxing may result in different pre-event sAA levels compared to judo (Papacosta et al., 2015).

The significance of sAA as a reliable anxiety-related biomarker in athletic contexts is supported by several empirical studies. According to Strahler et al. (2010), heightened anxiety and cognitive focus were associated with a significant increase in sAA levels in the hour before competition for elite karate athletes. Similarly, Obmiński et al. (2017) found that fencers and judo athletes had higher levels of sAA right before competitive matches, indicating that this enzyme is a reliable indicator of pre-competitive arousal. These findings underline the potential of sAA as a research tool, but, as a tool for coaches and sport psychologists aiming to monitor and manage athlete readiness.

Salivary alpha-amylase (sAA), which is produced by the hypothalamic-pituitary-adrenal (HPA) axis and typically reflects chronic stress or delayed responses, is a

powerful and non-invasive biomarker that reflects the activity of the sympathetic-adrenal-medullary (SAM) axis. Unlike cortisol, which comes from the hypothalamic-pituitary-adrenal (HPA) axis and usually reflects chronic stress or delayed responses, salivary alpha-amylase (sAA) reacts quickly to acute psychosocial stressors, making it an essential tool for evaluating moment-to-moment changes in psychophysiological arousal.

The parotid and submandibular glands secrete salivary alpha-amylase, a digestive enzyme that is regulated by the sympathetic nervous system, especially through noradrenergic stimulation. The SAM axis, which is activated in response to perceived or actual threats, such as competitive or evaluation stress in athletes, causes the release of the enzyme. Significantly, sAA levels provide a temporally accurate indicator of acute anxiety because, in contrast to cortisol, they increase 5–10 minutes after being exposed to a stressor (Rohleder & Nater, 2009).

sAA is a valid predictor of psychological stress and anxiety related to performance, according to recent experimental and meta-analytical studies. For example, research has shown that increases in sAA closely resemble increases in state anxiety before academic testing, public speaking, and athletic performance (Roeser et al., 2012). These results demonstrate its psychological sensitivity and its capacity to record autonomic reactions indicative of an athlete's internal state of arousal. Furthermore, compared to self-report anxiety inventories and cortisol-based measures, sAA measurements are comparatively unaffected by subjective reporting biases or diurnal variations (Ali & Nater, 2020).

Investigations involving archers, runners, judo athletes, and fencers have also confirmed the usefulness of sAA in athletic contexts. Elite karate athletes, for instance, showed a notable increase in sAA levels before competition when compared to baseline, and these elevations were linked to higher mental effort and perceived anxiety, according to Strahler and colleagues (2010). This responsiveness makes sAA a useful biomarker for identifying the acute psychophysiological arousal that precedes athletic performance, particularly in high-psychological-load combative sports.

Scientifically speaking, sAA is also beneficial because it is simple to collect, non-invasive, and does not have the negative side effects that blood sampling frequently causes. Its collection does not require specialised medical personnel, enabling field-based assessments in real-time environments like training halls or locker rooms (Obmiński et al., 2017). Because of its ease of use, it can be used in academic settings and with amateur athletes, where more invasive physiological tests may be restricted due to ethical and practical issues. In sports psychology research, sAA is a gold-standard biomarker for short-term stress and anxiety reactivity because of these advantages. Because of its logistical ease and sensitivity to acute stress, it is especially well-suited for comparative profiling of pre-event anxiety in sports like boxing and judo, where quick changes in mood and body can have a significant impact on performance.

Despite the increased recognition of psychophysiological biomarkers in sports research, there remains a dearth of empirical investigations examining how pre-event anxiety manifests across different combative sports disciplines. In particular, little is understood about the differences in salivary alpha-amylase levels between boxers and judokas prior to competition and whether or not these differences can be significantly connected to psychological demands unique to each sport. Understanding how athletes in each domain react to competitive stress can help develop specialised psychological training programs and intervention strategies, given the unique characteristics of these sports in terms of rules, engagement style, and performance expectations. In order to close a large gap in the literature on stress reactions unique to sports, this study aims to investigate these physiological indicators of anxiety.

To better understand the pre-event anxiety profiles of university combative sports athletes—judokas and boxers in particular—the study measured changes in their sAA levels at two crucial points in time: two months before the competition day and right before the event. Both within-subject variation (e.g., change from baseline to pre-event) and between-group differences (e.g., boxers vs. judokas, males vs. females) can be detected by comparing these biomarkers over these two time points. Sport-specific psychophysiological patterns that represent variations in how athletes mentally and physically prepare for competition are revealed by such analysis. Consequently, these variations inform customised psychological training regimens that take into account the unique characteristics of every combative sport.

2. Methodology

The pre-event anxiety profiles of university combative sports athletes who are boxers and judokas were assessed using salivary alpha-amylase proximal to competition in this two-group pre-test post-test study. 14 male and female athletes (Age M=21.29) were sampled for the study; they included 7 boxers (M=34.23, SD=5.96) and 7 judokas (M=34.91, SD=4.17). Because of their high level of intensity and potential for severe pre-event anxiety, the sports were selected. Each willing participant had saliva samples taken twice, an hour before the start of the game (pre-event) and two months before the main competition (baseline).

To account for daily fluctuations in alpha-amylase levels, samples were taken at 9:00 am using cryogenic vials that can withstand extremely low temperatures. They were stored under -80°C sample storage conditions. Salivary alpha-amylase levels were analyzed using an ELISA kit protocol (CSL0526Hu), a reliable and sensitive method for measuring sAA concentrations. Descriptive statistics were used to summarize participant characteristics and sAA levels. Inferential statistics of t-test was used to compare means between two groups (e.g., male vs. female, or boxing vs. judo) and an ANCOVA to compare means across multiple groups, sports' pre-test (baseline) and post-test (pre-event) of judo, and boxing at a 0.05 significance level.

3. Result and Discussion

Table 1. ANCOVA Summary on Difference in the Baseline and Pre-competitive event Salivary Alpha-amylase Data for Assessing Pre-event Anxiety profiles of University Combative Sports Athletes

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	745.667[a]	10	74.567	1.911	.324
Intercept	1905.653	1	1905.653	48.844	.006
Pre-test	745.667	10	74.567	1.911	.324
Error	117.045	3	39.015		
Total	3072.770	14			
Corrected Total	862.712	13			
a. R Squared = .864 (Adjusted R Squared = .412)					

Table 1 reveals the ANCOVA result obtained from assessing the pre-event anxiety profiles of university athletes through salivary alpha-amylase proximal to competition using the baseline and pre-competitive event data (f= (1) 48.84, $p < .05$). The p-value in the table is below the threshold, leading to the affirmation that salivary alpha-amylase assesses the pre-event anxiety profiles of university athletes proximal to competition through comparing the baseline and pre-competitive event data of the two groups.

Table 2. T-test result Summary on Sport-based Difference in the Assessment of Pre-event Anxiety Profiles of university combative sports Athletes through Salivary Alpha-Amylase

Sports	N	Mean	Std. Deviation	Std. Error Mean	*t*	df	Sig
Boxing	7	12.01	8.94	3.38	.-0.24	12	0.81
Judo	7	13.11	7.95	3.00			

Table 2 shows the t-test result of the Sport-based difference in the assessment of pre-event anxiety profiles of university boxers and judokas through Salivary Alpha-Amylase data collected proximal to competition [t (12) = -0.24, $p > .05$]. The p-value is above the threshold, leading to the assertion that there is no significant sport-based difference in the pre-event anxiety profiles of university combative sports athletes assessed through salivary alpha-amylase data proximal to competition, although the mean scores indicated otherwise (M=12.01, 13.11).

Table 3. T-test Result Summary on gender-based Difference in male and female pre-event anxiety profiles of University Combative Sports Athletes assessed through Salivary Alpha-amylase proximal to Competition

Gender	N	Mean	Std. Deviation	Std. Error Mean	*t*	Df	Sig
Female	6	16.40	10.25	4.18			
Male	8	9.69	5.11	1.81	1.47	6.87	0.19

Table 3 reveals the t-test result of the gender-based difference in salivary alpha-amylase data used for assessing the pre-event anxiety profiles of university combative sports athletes proximal to competition [t (6.68) = 1.47, $p > .05$). The p-value is above the threshold, leading to the declaration that there is no difference in

the pre-event anxiety profiles of university combative sports athletes assessed through salivary alpha-amylase proximal to competition despite females having higher mean score (16.40) than male participants (9.69).

Discussion of Findings

This study investigated the pre-event anxiety profiles of collegiate combative sports athletes, specifically the boxers and judokas, using salivary alpha-amylase proximal to competition. According to the first result, which compares baseline and pre-event data for the two groups. Salivary alpha-amylase assesses the pre-event anxiety profiles of university combative sports athletes. This implies that as competition draws near, athletes participating in combative sports see a noticeable increase in sympathetic arousal. Additionally, sAA indicates instantaneous psychological and physiological arousal, unlike cortisol, which has a delayed response time. It offers a more precise and timely understanding of how athletes' bodies respond right before competition (Capranica et al., 2017).

SAA is emphasised by Ali and Nater (2020) as a legitimate and trustworthy indicator of autonomic nervous system (ANS) activity. It highlights how useful sAA is in behavioural medicine for evaluating stress-related symptoms, particularly in situations where self-reports might not be accurate. Additionally, sAA levels and stress-related anxiety were found to be significantly correlated by Rashkova et al. (2012), indicating that sAA may be used as an objective indicator of a person's psychosomatic state in stressful situations. Santos et al. (2021) further found that higher levels of stress and anxiety were linked to increased sAA activity in a study involving nursing professionals. This implies that sAA can be an effective tool for assessing psychological states, especially in high-stress occupations where self-reporting may be influenced by various factors such as stigma, denial, or a lack of self-awareness.

These studies collectively support the use of sAA as an objective biomarker for assessing stress and anxiety, especially in situations where self-reported measures may be compromised. It allows for multi-modal assessment of anxiety profiles, both biological and psychological, for a more holistic understanding. As a result, coaches and sport psychologists can use sAA levels to customise psychological interventions.

Another finding from this study stated that the statistical analysis did not find any significant sport-based differences in the pre-event anxiety profiles of university combative sports athletes, specifically between boxers and judokas. However, the difference in mean scores (M = 12.01 for boxers and M = 13.11 for judokas) suggests that there may be subtle physiological differences between the two sports. This numerical discrepancy, while not statistically significant, illustrates the contextual and psychological variations in how athletes from each discipline view and respond to competitive stress. Variations in anticipatory stress responses, for example, may be caused by disparities in combat, perceived risk, pacing, or necessary tactical control (Inácio & Lima-Silva, 2021; van Paridon et al., 2017). The lack of statistical significance does not completely rule out these physiological

signals; rather, it highlights the intricate relationship between individual variability, sport-specific demands, and the sensitivity of biomarkers such as alpha-amylase. This emphasises how important it is to combine physiological markers with qualitative or psychological assessments to gain a deeper understanding of the complex anxiety profiles that can appear in various combative sports environments. In a study conducted during an international competition, Papacosta et al. (2015) measured the anxiety levels and salivary hormones of judo athletes. The results showed that winners had higher levels of cognitive anxiety than losers, but there were no discernible differences in somatic anxiety or self-confidence. This implies that improved performance in judo competitions may be linked to higher levels of cognitive anxiety. In a different study, Capranica et al. (2017) measured salivary cortisol levels and sAA in young taekwondo athletes during a tournament. The findings demonstrated that both cortisol and sAA levels rose in reaction to the competitive stress, suggesting that these biomarkers are reliable for evaluating acute stress and anxiety in actual athletic environments.

Furthermore, Lim (2016) examined the connection between 19 female collegiate archers' performance at a national competition, anxiety, and salivary alpha-amylase (sAA) levels. Three time points were used to gather saliva samples and self-reported anxiety levels: ten minutes before the game (pre-10), one minute before the game (pre-1), and ten minutes following the game (post-10). The findings revealed that both sAA concentrations and anxiety levels significantly increased at pre-1 and post-10 compared to pre-10. Additionally, anxiety and sAA levels were positively connected, and both had a negative correlation with game performance. These findings highlight sAA as a reliable biomarker for evaluating acute stress and anxiety in real-world sports, indicating that elevated sAA levels are linked to increased anxiety and decreased performance.

The study's final finding showed no gender based differences in the pre-event anxiety profiles of university combative sports athletes as measured by salivary alpha-amylase proximal to competition, although female participants had a higher mean score than male participants. This finding provides significant interpretive insights into the complex relationship between pre-event anxiety and gender among athletes participating in combative sports at universities. Female athletes having higher mean salivary alpha-amylase (sAA) levels ($M = 16.40$) than male athletes ($M = 9.69$) suggests that as competition draws near, the sympathetic nervous system is more activated in females. The higher levels of sAA in females suggest a different way of internalising pre-event arousal or a higher biological sensitivity to competitive stress, even though the lack of statistical significance suggests that the observed difference may be influenced by several factors, including individual variability (Lucas et al., 2019).

This physiological trend is consistent with previous research that indicates women frequently report and exhibit higher levels of stress reactivity, especially in situations that are performance- or evaluation-based (Cuttler et al., 2017). College crew team members' salivary alpha-amylase reactions to competition were studied by Kivlighan and Granger (2006). According to their findings, both genders' sAA levels dramatically rose in response to competition, with females showing higher

mean levels than males. These variations were not statistically significant, though, suggesting that stress reactions were similar for both sexes. In a similar vein, Lim (2016) examined the relationship among female collegiate archers' performance, anxiety, and sAA. The study discovered a positive correlation between anxiety levels and sAA concentrations, as well as notable increases in both as the competition drew near. This study highlights the sensitivity of sAA, even though it only looked at female athletes, as a marker for pre-competition anxiety.

It also raises the question of whether this physiological reaction is a functional arousal state that enhances performance readiness or if it correlates with subjective anxiety. Therefore, the implication is not only that there might be gender-specific patterns of physiological arousal before competition, but that these patterns might not always be statistically significant in comparisons at the group level. This emphasises how crucial it is to consider both statistical results and practical or clinical significance when analysing biomarker data, particularly when developing gender-sensitive psychological interventions or arousal regulation techniques in sports.

4. Conclusion

The study demonstrated the usefulness of salivary alpha-amylase in effectively capturing the pre-event anxiety profiles of university combative sports athletes, highlighting its utility as a physiological marker of anticipatory stress. Despite discernible differences in mean scores, pre-event anxiety levels did not differ significantly by gender or sport type (judo vs. boxing). In particular, judokas and female athletes had higher mean sAA levels than boxers and male athletes. This suggests that there may be physiological arousal trends related to sport and gender that did not reach significance but may still be useful.

Recommendation

It is recommended that sport psychologists and coaches use salivary alpha-amylase monitoring in conjunction with psychological assessments to create customised arousal regulation strategies for individual pre-event anxiety responses, with particular attention to subtle sport- and gender-related physiological trends.

References

Ali, N., & Nater, U. M. (2020). Salivary alpha-amylase as a biomarker of stress in behavioral medicine. *International Journal of Behavioral Medicine, 27*(3), 337–342. https://doi.org/10.1007/s12529-020-09843-x

Bosch, J. A., Veerman, E. C., de Geus, E. J., & Proctor, G. B. (2011). α-Amylase as a reliable and convenient measure of sympathetic activity: Don't start salivating just yet! *Psychoneuroendocrinology, 36*(4), 449–453. https://doi.org/10.1016/j.psyneuen.2010.12.019

Capranica, L., Condello, G., Tornello, F., Iona, T., Chiodo, S., Valenzano, A., ... & Cibelli, G. (2017). Salivary alpha-amylase, salivary cortisol, and anxiety during a youth taekwondo championship: An observational study. *Medicine*, 96(28), e7272. https://doi.org/10.1097/MD.0000000000007272

Cuttler, C., Spradlin, A., Nusbaum, A. T., Whitney, P., Hinson, J. M., & McLaughlin, R. J. (2017). Blunted stress reactivity in chronic cannabis users. *Psychopharmacology*, *234*, 2299-2309.

Franchini, E., Takito, M. Y., & Kiss, M. A. P. D. M. (2019). Pacing in judo: Analysis of international-level competitions with different durations. *Journal of Strength and Conditioning Research*, 33(2), 356–362. https://doi.org/10.1519/JSC.0000000000002953ResearchGate

Grushko, A., Bochaver, K., Shishkina, A., Kabanov, D., Konstantinova, M., Vavaev, A., & Kasatkin, V. (2016). Psychological and psychophysiological profile in combat sports. *Revista de Artes Marciales Asiáticas, 11*(2s), 70–71. https://doi.org/10.18002/rama.v11i2s.4176revpubli.unileon.es

Inácio, M., & Lima-Silva, A. E. (2021). The Performance during the Exercise: Legitimizing the Psychophysiological Approach. In *IntechOpen*. https://www.intechopen.com/chapters/80550

Lim, I. S. (2016). Correlation between salivary alpha-amylase, anxiety, and game records in the archery competition. *Journal of Exercise Nutrition & Biochemistry*, 20(4), 44–47. https://doi.org/10.20463/jenb.2016.0050PMC+1PubMed+1

Lucas, B. D. L., Barbosa, T. D. S., Castelo, P. M., & Gavião, M. B. D. (2019). Salivary alpha-amylase and hormones levels of young adults with different body composition. *Journal of Texture Studies*, *50*(1), 45-52.

Matsumoto, K., et al. (2021). Precompetitive stress in rhythmic gymnasts. *Medicine & Science in Sports & Exercise*, 53(8S), 1005. https://journals.lww.com/acsm-msse/fulltext/2021/08001/precompetitive_stress_in_rhythmic_gymnasts.1005.aspxLippincott Journals

Miarka, B., Brito, C. J., Amtmann, J., Córdova, C., Bello, F. D., & Camey, S. (2018). Suggestions for judo training with pacing strategy and decision making by judo championship phases. *Journal of Human Kinetics*, 64, 219–232. https://doi.org/10.1515/hukin-2017-0196PMC

Nater, U. M., & Rohleder, N. (2009). Salivary alpha-amylase as a non-invasive biomarker for the sympathetic nervous system: Current state of research. *Psychoneuroendocrinology, 34*(4), 486–496. https://doi.org/10.1016/j.psyneuen.2009.01.014

Obmiński, Z., Litwiniuk, A., & Mroczkowska, H. (2012). Correlation between salivary alpha-amylase and stress-related anxiety. *Przegląd Lekarski*, 69(10), 1045–1048. https://pubmed.ncbi.nlm.nih.gov/23101285/

Obmiński, Z., Litkowycz, D., & Bujak, Z. (2017). Usefulness of salivary biomarkers in sports medicine. *Journal of Health Sciences, 7*(4), 295–301. https://doi.org/10.17532/jhsci.2017.441

Papacosta, E., Nassis, G. P., & Gleeson, M. (2015). Salivary hormones and anxiety in winners and losers of an international judo competition. *Journal of Sports Sciences, 34*(13), 1281–1287. https://doi.org/10.1080/02640414.2015.1111521

Rashkova, M. R., Ribagin, L. S., & Toneva, N. G. (2012). Correlation between salivary alpha-amylase and stress-related anxiety. *Folia Medica*, 54(2), 46–51. https://doi.org/10.2478/v10153-011-0088-4Mendeley+1PMC+1

Roeser, K., Schwerdtle, B., Eichholz, R., Küber, A., & Schlarb, A. A. (2012). Relationship of sleep quality and chronotype with salivary alpha-amylase: Evidence for a differential role of chronotype in stress regulation. *Biological Psychology, 89*(2), 205–211. https://doi.org/10.1016/j.biopsycho.2011.10.020

Rohleder, N., & Nater, U. M. (2009). Determinants of salivary α-amylase in humans and methodological considerations. *Psychoneuroendocrinology, 34*(4), 469–485. https://doi.org/10.1016/j.psyneuen.2008.12.004

Rossi, C., Roklicer, R., Tubic, T., Bianco, A., Gentile, A., Manojlovic, M., Maksimovic, N., Trivic, T., & Drid, P. (2022). The role of psychological factors in judo: A systematic review. *International Journal of Environmental Research and Public Health, 19*(4), 2093. https://doi.org/10.3390/ijerph19042093PMC+1MDPI+1

Santos, S. V. M., Dalri, R. C. M. B., Bardaquim, V. A., Robazzi, M. L. C. C., et al. (2021). Association of salivary alpha-amylase with anxiety and stress in nursing professionals. *Revista Brasileira de Enfermagem*, 74(4), e20200663. https://doi.org/10.1590/0034-7167-2020-0663PMC

Strahler, J., Berndt, C., Kirschbaum, C., & Rohleder, N. (2010). Salivary alpha-amylase response to a psychosocial stressor in a socio-economically diverse sample. *Psychoneuroendocrinology, 35*(3), 392–399. https://doi.org/10.1016/j.psyneuen.2009.07.012

Suay, F., Salvador, A., González-Bono, E., Sanchís, C., Martínez, M., Martínez-Sanchís, S., ... & Montoro, J. B. (1999). Effects of competition and its outcome on serum testosterone, cortisol and prolactin. *Psychoneuroendocrinology*, 24(5), 551–566. https://doi.org/10.1016/S0306-4530(99)00011-8

van Paridon, K. N., Timmis, M. A., Nevison, C. M., & Bristow, M. (2017). The anticipatory stress response to sport competition: A systematic review with meta-analysis of cortisol reactivity. *BMJ Open Sport & Exercise Medicine*, 3(1), e000261. https://doi.org/10.1136/bmjsem-2017-000261

Ziv, G., & Lidor, R. (2013). Psychological preparation of competitive judokas – A review. *Journal of Sports Science and Medicine, 12*(3), 371–380. https://pmc.ncbi.nlm.nih.gov/articles/PMC3772577/

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